



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/647,985	08/26/2003	Patricia Beauregard Smith	TI-33260	3087
23494	7590	06/28/2007	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			EL ARINI, ZEINAB	
		ART UNIT	PAPER NUMBER	
		1746		
			NOTIFICATION DATE	DELIVERY MODE
			06/28/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com  
uspto@dlemail.itg.ti.com

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/647,985	SMITH ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Zeinab E. EL-Arini	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 21 February 2007.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-6,8-15,17,18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-6,8-15,17,18 and 20 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) Notice of Informal Patent Application
- 6) Other: \_\_\_\_\_.

**DETAILED ACTION**

The final rejection stated in paper No. 20060906 has been withdrawn in view of applicants' remarks.

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 8-9, 11-12, 15, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Chang (5,643,407).

Re. claims 1, 8, Chang discloses a method of forming the intermetal dielectric layer of an integrated circuit. The reference teaches the patterning step (col. 2, line 45-col. 3, line 17), the wet cleaning step and the annealing step (col. 3, lines 18-37). Re. claims 9, 11 and 12, see col. 3, lines 44-47, and claim 1, 5. Re. claim 15, it is inherent in the Chang process. Re. claim 18, see col. 2, lines 55-57.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1746

4. Claims 5-6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang' 407 in combination with Nguyen et al. (2003/0104320).

Chang' 407 as discussed supra does not teach dry cleaning (using plasma) before cleaning the polymer residue.

Nguyen et al. disclose that the conventional photoresist removal sequence typically consists of combination of a dry strip process using oxygen to remove the bulk of the photoresist layer and a wet clean process to remove the residues and metal contaminants, and the conventional sequence further includes an anneal step to remove any moisture resulting from the wet strip. See paragraph 7.

It would have been obvious for one skilled in the art to use the plasma cleaning before the wet cleaning in Chang' 407 process, because it is well known in the conventional photoresist removal sequence. Re: claim 17, the metal deposit in Chang' 407 may include copper.

5. Claims 2-4, 10, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang' 407 in combination with Nguyen et al. (2003/0104320) as applied to claims 5-6 and 17 above, and further in view of Chang et al. (2003/0008518), Chiu et al. (6,107,202), and Akino et al. (6,417,108).

Re. claim 2, see Chang et al, claims 4 and 14.

Re. claim 4, see Chiu et al, col. 8, last line.

Re. claim 10, one skilled in the art would adjust the anneal temperature to obtain optimum results. Re. claims 13 and 14, one skilled in the art would adjust the time to

obtain optimum results. This is also because the time for annealing depends on the amount of moisture to be removed from the surface.

Re claim 3, it is well known in the art to use acid in wet cleaning wafer. See Akino et al., col. 6, lines 30-31.

It would have been obvious for one skilled in the art to use the solvent taught by Chiu et al. and the acid taught by Akino et al. in the Chang' 407 process to improve the cleaning process. One skilled in the art would use the dielectric layer taught by Chang et al' 518 in the Chang' 407 process because the dielectric layer in both references are equivalent.

6. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. (2002/0058397).

Smith et al. teach a method of fabricating an electronic device. The reference discloses performing plasma strip, wet cleaning, low pressure anneal, fluorine based solvent as claimed. See claims 1-5, 30-31, and paragraph 24, lines 12-15. The acid, see pages 25 and 27.

The reference does not teach the high temperature, limited duration anneal as claimed.

It would have been obvious for one skilled in the art to use the process taught by Smith et al. to remove volatile cleaner compounds from a post-etch substrate as claimed, because high temperature anneal and the limited- duration anneal are very

broad terms. One skilled in the art would adjust the temperature and the time to improve the cleaning process.

***Response to Arguments***

7. Applicant's arguments with respect to claims 1-6, 8-15, 17-18, and 20 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zeinab E. EL-Arini whose telephone number is (571) 272-1301. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1746

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*Zeinab El-Arini*

Zeinab E. EL-Arini  
Primary Examiner  
Art Unit 1746

ZEE  
6/20/07